NIMBUS-7

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Launch Date: Oct. 24, 1978
Projected SC Life/DSN Support: 15 years/11 years

Project Responsibility: Goddard Space Flight Center (GSFC)

Source: SIRD August 1983/NSP
Sponsor: OSO

A. MISSION DESCRIPTION

The Nimbus program provides for the research and development of a series of large automated spacecraft for the flight test of advanced instruments for pollution, oceanographic, and meteorological applications. The basic spacecraft is attitude-stabilized in three axes, with the yaw axis always pointing towards the center of the Earth. The spacecraft provides a stable platform, power, command, and data handling support for active and passive sensors for daily global surveillance of the atmosphere, and for mapping details of the atmospheric structure and the Earth surface from satellite altitudes. The primary objectives of the Nimbus-7 mission are as follows:

(1) To observe gases or particulates in the troposphere to determine the feasibility of mapping sources, sinks, and dispersion mechanisms of atmospheric pollutants.

(2) To observe ocean color, temperature, and ice conditions, particularly in coastal zones, with sufficient spatial and spectral resolution to determine the feasibility of applications such as detecting pollutants on the water surface; determining the nature of materials suspended in the water; applying the observations to the mapping of sediments, biologically productive areas, and interactions between coastal effluents and open ocean water; and demonstrating improvement in ship route forecasting.

B. FLIGHT PROFILE

To provide daily global coverage, the Nimbus-7 spacecraft was launched October 24, 1978 into a nominally circular Sun-synchronous orbit at an altitude of approximately 955 km. The inclination of the orbit plane was established at a value (approximately 99 degrees) such that orbital precession keeps the local time of equator crossing at 1200 local time, northbound. The nominal altitude and time of equator crossing was selected to meet experiment requirements for geographical resolutions, coverage, and data acquisition.

C. COVERAGE

The DSN began support on February 1, 1985.

1. Coverage Goals

Coverage will be provided through end of mission and will consist of twelve 15-minute passes per day. (The minimum requirement is nine 15-minute passes per day.)

2. Network Support

The support provided by the DSN is indicated in the following table:

System	Goldstone	Canberra	Madrid
	12 14 15 16	42 43 45 46	61 63 66
S-band TLM	P	P	P
S-band CMD	P	P	P
S-band TRK	P	P	P

NOTE: P = Prime

D. FREQUENCY ASSIGNMENTS

Frequencies are allocated according to the following table:

System	Uplink (MHz)	Downlink (MHz)	Polarization
S-band TLM	--	2211.0 (Link 1)	RCP
	--	2273.5 (Link 2)	RCP
S-band CMD	2093.5	--	RCP
S-band TRK	2093.5	2273.5	RCP

E. SUPPORT PARAMETERS

The support parameters for the Telemetry, Command, and Support Systems are listed below:

(1) Telemetry

Data Streams	3
Format (Link 1)	PCM(SP-L)/FM
(Link 2)	PCM(SP-L)/PSK/PM and PCM(SP-L)/PM
Subcarrier Frequency (Link 2)	1560 kHz
Bit Rates (Link 1)	800 kb/s
(Link 2)	4 kb/s and 800 kb/s
Coding	None
Record	Required

(2) Command

Format	PCM(NRZ-L)/PSK-Summed/FM/PM
Subcarrier Frequency	2 kHz PSK, 70 kHz FM
Bit Rate	1000 b/s

(3) Support

Uplink Power	2 kW (nominal)
Antenna Rate	High
Antenna Angle Data	TBD
Antenna Autotrack	Required
Doppler Rates	TBD
Range Format	Tone on 70 kHz subcarrier
Recording	
. Analog	Required
. Digital	Not required

F. TRACKING SUPPORT RESPONSIBILITY

The allocation of responsibilities for tracking support is listed in the following table:

Mission Phase	Support Responsibility
Earth Orbit	STDN (through Jan. 1985) DSN (after Jan. 1985) STDN BLT (after Jan. 1985)

The international GPS global network consists of six stations, all of which are equipped with GPS receivers and their connections to communication links with the appropriate operations center. For this mission the operations center is at JPL. Three of the sites are at the existing deep space stations, namely Goldstone, California, Tidbinbilla, Australia, and Robledo, Spain. The additional three sites are at Usuda, Japan, which is the location of its 64-m deep space station; Hartebestock, South Africa, which operates by French network stations with headquarters in Toulouse, France. For this project the interface for the data from South Africa is at Toulouse. The third site is at the former STDN complex 35 miles north of Santiago, Chile. The three sites will be covered by memorandums of agreements between NASA and the indigenous agencies, namely Institute of Space & Astronautical Sciences, Tokyo, Japan; the French network (CNES), which will be responsible for acquiring the data in South Africa and transmitting it to NASA JPL; and the University of Chile in Santiago, which has acquired all of the NASA STDN facilities and will maintain and operate the NASA equipment on loan and transmit the data to NASA JPL.

The JPL DSN will assume the lead role as "GPS Network Coordinator," with responsibility to initiate, facilitate, negotiate, and otherwise successfully execute all joint network operational aspects, including planning, documentation, configuration, communications, and monitor and control, of the joint DSN-International Agencies GPS Six-Station Network.